Workshop on
Biometrics and E – Authentication Over Open Networks

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Topic: Multi-Modal Biometric Approaches to Anti-Spoofing

Abstract: User authentication is fundamental to the protection of information systems. It is the first and most critical link in the security chain that restricts access to system and data resources to authorized users only. Electronic authentication (e-authentication) poses new challenges over traditional authentication means, which is no longer restricted to supervised local users. E-authentication makes it possible that authenticate unsupervised remote users, which, in turn, increases the risk of spoofing attacks.

The advantages of using biometrics to prove identity over using passwords or tokens have been broadly reported. However, recent research has shown that biometric readers can be defeated with a combination of low-tech, cheap materials as well as digital editing tools. These attack methods are called "spoofing." They are attempts to "fool" a biometric system by presenting a fake biometric trait to the sensor. This is a serious problem when people intend to use biometrics as a means to enhance security. Different technologies have been developed to counter these spoofing attacks. One solution is multi-modal biometric fusion.

This presentation will focus on the research being conducted into anti-spoofing techniques at Defence R&D Canada – Ottawa. First, the presentation briefly introduces the problems unique to e-authentication. Then, it presents a review of spoofing attacks on different biometric technologies. Next, anti-spoofing efforts are discussed with an analysis of their strengths and limitations. Finally, two multi-modal biometric fusion approaches are introduced. One is based on fusing independent biometric traits so that adding a biometric trait is the same as adding another authentication factor. The other approach is using associated biometric traits. Research has been undertaken at DRDC-Ottawa to investigate the benefit of fusion on associated multi-modal biometric traits.

Biography: Qinghan Xiao received the Ph.D. degree in computer science from the University of Regina, Regina, Saskatchewan, Canada, in 1994. He started the R&D on biometrics to develop an Automated Fingerprint Identification System in 1982. To improve the accuracy and overcome distortion problems, Dr. Xiao defined false miniature structures to reduce the error rate, and developed a method that used ridge count for fingerprint recognition.

Since 2002, Dr. Xiao has been a Defence Scientist at Defence Research and Development Canada. His current research interests include biometric authentication, multi-modal biometric systems, anti-spoofing technologies, and smart card with biometrics in network security applications. Dr. Xiao has published numerous scientific papers in the areas of biometrics, remote sensing and image understanding. The projects that he worked as a major contributor included Automated Fingerprint Identification System (1982-1985), The First Digital Land Cover Map of Canada (1994-1997), and Circuit Miner to perform reverse analysis of integrated circuits and smart cards (1997-2000). He has been a speaker at national and international conferences and holds two patents in the area of image understanding.